

**Environmental sustainability orientation, reward-based crowdfunding, and venture capital:
The mediating role of crowdfunding performance for new technology ventures**

Paolo Roma^{1a*}, Maria Vasi^{1b}, Stefania Testa^{2c}, Giovanni Perrone^{1d}

¹ Università degli Studi di Palermo, Viale delle Scienze, 90128, Palermo, Italy

² Università degli Studi di Genova, Via all'Opera Pia, 15 - 16145, Genoa, Italy

^apaolo.roma@unipa.it, ^bmaria.vasi@unipa.it, ^cstefania.testa@unige.it, ^dgiovanni.perrone@unipa.it

* Corresponding author

Abstract

Extant literature has investigated the effects of new ventures' environmental sustainability orientation (ESO) on the crowdfunding (CF) performance and on the ability to secure venture capital, separately and with mixed results. We address the study of these relationships simultaneously. Specifically, we examine how the presence of ESO feature influences new technology-based ventures' ability to secure funding in reward-based CF campaigns and how the CF performance mediates the effect of such feature on attracting subsequent venture capital. Using a sample of new hardware ventures that have launched a CF campaign on Kickstarter, we document a negative effect of the presence of ESO on the CF performance. We also find that, for new hardware ventures using reward-based CF, the presence of ESO has a positive direct effect on the likelihood of receiving subsequent venture capital after CF, as well as a negative indirect effect due to its negative impact on the performance in CF.

Keywords: Crowdfunding; Venture Capital; Environmental Sustainability; New Technology Ventures.

1 Introduction

Environmental sustainability has become a very important issue in society and business in recent years [1]. Firms' awareness on "green" innovations has increased substantially, with numerous firms playing a pro-active role through increased investments in energy efficiency, a focus on waste reduction and the use of materials/processes having lower pollution impact [2], [3]. Along with the growing trend toward environmental sustainability, environmentally oriented new ventures have grown considerably in terms of number and importance [4]. Nevertheless, whether these ventures are exposed to the same opportunities to secure financial resources through traditional funding channels as ventures not pursuing environmental sustainability goals is still debated [5].

There exist indeed two opposite streams of literature in this regard. According to a first stream, environmental sustainability-oriented new ventures face several challenges in accessing financial resources, as compared with their non-environmentally oriented counterparts, and this significantly limits their survival and growth [6]. According to these studies, the former are likely to be less attractive in the eyes of professional investors (e.g., business angels, venture capitalists) than the latter [7]. Indeed, environmental sustainability-oriented new ventures do not exclusively focus on economic returns, rather they also pursue environmental and social goals, which are of the same or even higher importance as compared with the profitability goal. This implies that environmental sustainability-oriented new ventures may intrinsically face higher difficulty to provide tangible, direct and measurable outputs at least in the short term, and may also face higher technical and managerial complexity due to the infancy of this type of entrepreneurship [8]. In turn, this may restrain funding from professional investors, thus becoming a central obstacle to the development of this type of new ventures [9]. Overall, the underlying assumption in this stream of literature is that there is an inherent trade-off between environmental and economic performance.

On the contrary, a second stream of literature recognizes the capacity of sustainable entrepreneurship to offer innovative solutions to important social and environmental problems and points out that the growing trends toward green innovations has generated the interest of professional investors [10],

[5]. Specifically, some recent studies claim that the environmental orientation of new ventures increases their chances of being financed by professional investors, in light of the increasing concerns toward scarcity of natural resources, pollution and global warming [11]. This stream of literature challenges the common notion that there is a trade-off between environmental and economic performance and assumes that sustainable businesses may exploit win–win situations that reconcile environmental protection and financial success [12].

These contrasting views suggest that the relationship between the presence of environmental sustainability orientation (ESO) and new ventures' access to traditional funding channels is still unclear and deserves further investigation.

In addition to the traditional funding channels investigated by the two literature streams above, in recent years a new funding method has gained popularity, crowdfunding (CF) i.e., a platform-based system where a small number of big professional investors are substituted by a very large number of individuals - mainly consisting of ordinary citizens – each supplying relatively small amounts of capital, which however become collectively relevant when aggregated. Although such a method is enthusiastically discussed in the media as an alternative means to finance sustainability-oriented initiatives, in the academic literature there is no consensus even in this case [13].

According to a first stream of literature, CF may represent a promising solution for providing financial support to new ventures focusing on environmental sustainability, in some circumstances compensating the lack of funding from traditional channels, while in other cases complementing this type of investments [14], [15]. This is because contributors to CF campaigns (especially in forms of CF that do not offer financial returns, such as reward-based CF) often have very different motivations to fund projects from those of professional investors, since they are often moved by altruistic or normative reasons making them more prone to support social and environmental causes [13]. Some works indeed document a positive relationship between the presence of ESO and the likelihood of success of CF projects [14]. In contrast, according to a second stream of literature, environmental

sustainability-oriented new ventures do not present a significant advantage in terms of CF success, but they may rather suffer from a disadvantage [8], [16], [17].

Given that the knowledge on the roles of both professional investors and CF in supporting environmentally oriented new ventures is still limited and characterized by opposite views, in this paper we aim to unravel these roles by analyzing them jointly. Specifically, the goal of this paper is twofold:

- 1) we study whether new ventures exhibiting ESO have an advantage or a disadvantage in securing funding in reward-based CF campaigns as compared with the non-environmentally oriented counterparts;
- 2) we examine the mediating role of reward-based CF performance in the relationship between new ventures' ESO (vs. non-ESO) and their ability to receive subsequent venture capital funding from professional investors.

Therefore, we do not only shed light on whether environmental sustainability-oriented new ventures have higher or lower likelihood of succeeding in reward-based CF. We also elucidate whether, for new ventures using reward-based CF, the effect of the presence of ESO (vs. non-ESO) on the likelihood of securing funding from subsequent professional investors is mediated by the performance in the CF campaign. Unraveling these aspects adds significantly to the extant knowledge because it would not simply allow understanding whether green new ventures are more or less exposed to funding in CF campaigns than their non-environmentally oriented counterparts. But it would also unveil the role of the performance in CF as a facilitator (or as an obstacle) that makes green new ventures using reward-based CF more (or less) attractive also in the eyes of professional investors and ignite (or reduce) their financing propensity. Moreover, it would also help clarify the overall comparative advantage or disadvantage of ventures characterized by ESO on the access to venture capital funding.

We consider reward-based CF as our template for two main reasons. First, it is one of the most popular CF forms [14]. Second, it has been largely considered in prior CF literature focusing on

environmental sustainability, given the popularity of this form of CF for sustainable projects [8], [14], [15]. Moreover, we focus on new technology-based ventures, specifically on hardware producers. This is because such ventures are characterized by high capital requirements and CF money is largely insufficient to fully support their growth process, which instead requires the injection of large amounts of capital [18], [19]. Therefore, these new ventures need to complement the amount possibly collected through reward-based CF with subsequent external funding provided by professional investors, thus being the most suitable template for our study.

We use data of new ventures that have launched a campaign in the hardware category (including ventures aiming at manufacturing consumer electronics, robotics, 3D printing, etc...) of the most popular reward-based CF platform, namely Kickstarter. The final sample encompasses 508 new hardware ventures, for which ESO is assessed in line with prior related studies as a dichotomous variable, namely presence or absence of ESO [8], [14]. By way of anticipation, we argue and find that the new ventures exhibiting ESO have lower performance in reward-based CF performance compared to their non-environmentally oriented counterparts. We also demonstrate the existence of a negative mediating role of reward-based CF performance in the relationship between the presence of ESO (vs. non-ESO) and the attainment of subsequent venture capital funding. Specifically, the direct effect of the presence of ESO (vs. non-ESO) on the likelihood of securing subsequent venture capital funding from professional investors is positive, whereas the effect mediated by the CF performance on the same probability is negative.

The paper unfolds as follows. In § 2 we advance our hypotheses. In § 3, we describe data, variables and methods used in this paper. In § 4 we present our empirical findings, while in § 5 present several robustness checks. Finally, we provide implications for theory and practice and conclude in § 6.

2 Literature background and hypotheses

2.1 ESO and CF performance

According to prior literature, new venture's ESO can be defined as the presence of objectives that focus on the preservation of Nature and the Earth's life support system in bringing into existence

products and processes aiming at generating economic and non-economic gains to individuals and society [14]. In general, the term “sustainability orientation” may refer to the product or the venture producing it. However, as we consider ventures in their early stages, the given new venture basically coincides with the innovative product it intends to commercialize. In fact, for an early-stage venture launching a reward-based CF, its product is essentially the reason for which the venture has been founded. As such, while our focus is on new ventures, the term “sustainability orientation” can refer to both venture and the product it intends to commercialize interchangeably.

Academic research has recently started examining whether new ventures focusing on environmental sustainability have higher or lower chances of success in CF campaigns as compared with their non-environmentally oriented counterparts. However, as anticipated earlier, opposite views have emerged in this regard, with some studies documenting a positive effect of the presence of ESO (vs. non-ESO) on CF performance (e.g., the amount raised in the campaign), and other studies reporting negative or insignificant effect of such new venture characteristic [13]. For instance, extending to all socially oriented ventures, some authors argue that these ventures should have an advantage when launching a CF campaign because campaign contributors make their financing decisions based on the new venture’s ability to target worthy social goals and match the value system of the community, rather than on the expectation of financial or nonfinancial rewards [13]. Others advance that both the desirability of the rewards and the extent to which the new venture’s mission and goals well espouse the ideology and the beliefs of the crowd regarding the causes and the solutions of different social needs will influence the performance in the CF campaign [14]. In particular, the fact that CF communities are usually frequented by young generations that have been shown to be more prone to prefer buying green and more socially responsible products should imply a favorable view of the crowd toward projects exhibiting ESO. Accordingly, these authors document a positive effect of the presence of ESO vs. non-ESO on CF performance [14].

Other studies question the above view [8], [20], [16]. For instance, some authors find no positive effect of the presence of ESO vs. non-ESO [8]. Actually, these findings provide indication that the

presence of ESO could negatively affect the success of CF projects, revealing that projects exhibiting ESO are less likely to reach their funding targets than any other category of projects and achieve the lowest average share of the targeted amount. Similarly, others show that ESO does not increase the odds of success in equity CF [16]. Results in [8] are interpreted considering the economic theory of rational choice [21] and the financing of public goods.

New ventures pursuing environmental sustainability aim to satisfy more collective needs, as compared with their non-environmentally oriented counterparts [22]. That is, they are more likely to offer benefits having a “public good” nature, i.e., goods non-excludable and non-rival in consumption, which provide indistinct benefit to the society. Note that this does not mean that such ventures do not offer private consumption benefits. It only implies that these private benefits are naturally less emphasized in new ventures exhibiting ESO, in comparison with their non-environmentally oriented counterparts. This is because, for new ventures exhibiting ESO, delivering “public good” benefits is likely to have the same or, sometimes, even higher importance than offering private consumption benefits due to their focus on sustaining environmental sustainability [8], whereas for new ventures not characterized by ESO private benefits have a more central role.

According to the rational choice theory [21], contributors to CF campaigns should have less incentive to invest in projects or new ventures providing, comparatively speaking, more “public good” benefits (e.g., goods protecting and preserving the environment) because the relative benefits of such projects will also be available to those who did not contribute to fund the project. Economic theory shows indeed rational underinvestment in public goods due to free-riding behavior, i.e., the possibility to appropriate collectively benefits from public goods without participating to the funding [23].

These arguments derived from the rational choice theory are reinforced by an “investor-as-consumer” perspective, adopted in recent works [24], [17]. It has been claimed that in reward-based CF “crowdfunders mainly contribute in exchange for future products or services, meaning that they behave like general consumers” ([24], p. 238). Therefore, reward-based CF can be viewed as a channel for early access to products and a form of pre-sale [25]. Accordingly, crowdfunders, despite

being generally perceived as investors, behave more like consumers, since they do not seek financial returns for their contributions, rather they just contribute to campaigns in exchange for pre-ordering products [25], [26]. As noted in [24], there are more similarities between crowdfunders on reward-based platforms and online shopping consumers than between crowdfunders on reward-based platforms and professional investors.

Grounding on consumer behavior literature, consumers make their purchase decisions, by considering both tangible and intangible attributes of products [27]. As products become more physically similar, intangible attributes play an increasingly prominent role in consumer purchase decisions [17]. Among intangible attributes, there is a specific group referred by some authors as ‘social’ [27] or ‘green’ attributes [28]. We refer to them as environmental sustainability attributes.

Concerning these attributes, some authors suggest that they positively affect consumer purchase decisions [27]. Other authors, on the contrary, claim that consumers mainly consider egoistic/conventional attributes (i.e., those providing consumers with more direct and visible benefits, thereby serving more self-interest needs), such as quality, taste, price, status, and brand, rather than sustainability-related ones [29]. A third group of authors sits in the middle, arguing that consumers do consider sustainability attributes in their purchase decisions but that these attributes are often pushed to the background. That is, consumers firstly focus on egoistic product attributes, and secondly on sustainability attributes [28]. Results are thus far from being consensual.

However, concerning new technology-based consumer products, i.e. the products considered in our paper, prior literature seems to be rather unanimous. For these products early consumers are mainly attracted in their purchase decisions by the technology itself, either for hedonic reasons or because driven by utilitarian needs, with a strong critical sense regarding the technology effectiveness, and purpose and experience of usage [30], [31]. In this case, attributes related to environmental sustainability tend to be of no interest [30] or at most they are claimed to be a nice addition when they do not conflict with the product’ s primary functionality [29].

Since the investors (of new hardware ventures) on reward-based CF platforms choose to commit to buy the given new technology product even before it is commercially available, they can be viewed as very early-stage consumers who pre-order technology products [32]. This means that the salient characteristics of early adopters (i.e., focus on technology, focus on hedonic or utilitarian product attributes, rather than on societal attributes) are intrinsically intensified for CF backers [32]. Hence, reward-based CF contributors are likely to show lower interest toward environmental sustainability-related attributes, especially for the category of new technology-based consumer products. This translates into comparatively lower interest towards sustainability-oriented new ventures as they offer benefits having more “public good” nature and thus having more limited emphasis on individual and immediate consumption benefits, as compared with new ventures that do not exhibit ESO [20].

We recognize that green buying (or more broadly sustainable buying) can be also done for individual/emotional “feel-good” purposes. However, in comparison with new ventures that do not exhibit ESO, those characterized by such feature naturally tend to put higher emphasis on environmental sustainability-related benefits, at the expense of a reduced emphasis on private consumption benefits. In addition, as explained above, for new technology-based consumer products, the former benefits are assessed by consumers (acting as investors in reward-based CF) as having less importance than the latter ones. Consequently, it may become more difficult for new hardware ventures exhibiting ESO to persuade the crowd to fund their projects, as compared with their non-environmentally oriented counterparts. Accordingly, we formulate our first hypothesis as follows:

Hypothesis 1 (H1): New hardware ventures exhibiting ESO display lower performance in reward-based CF than their non-environmentally oriented counterparts, in terms of both likelihood of success in the campaign and reached amount.

2.2 Environmental sustainability orientation and access to subsequent venture capital funding:

The (negative) mediating role of reward-based CF performance

The body of literature studying the ability of environmental sustainability-oriented new ventures to access external finance through traditional funding channels (e.g., business angels, venture

capitalists) is itself not fully developed and documents contrasting views. Initial works point out the difficulties encountered by these new ventures in securing funding from professional investors, as compared with their non-environmentally oriented counterparts [7], [9]. These challenges may significantly limit the survival and growth of environmentally oriented new ventures [6].

According to this stream of literature, the main rationale is that these new ventures do not focus exclusively on financial returns, which is instead the most important goal of professional investors [20]. Indeed, new ventures exhibiting ESO seek to achieve environmental and social goals to the same or greater extent than the profitability goal [7]. The intrinsic nature of these new ventures implies a number of characteristics that may locate them in a comparatively disadvantageous position. First, since sustainability-oriented new ventures are more likely share (entirely or partially) the characteristics of public goods, their outputs and the relative benefits are usually less tangible, less immediate and more dispersed, or at least the emphasis put on these aspects is less marked, as compared with their more commercial counterparts. This may restrain funding from professional investors because they seek objectively verifiable information on whether the new venture is able to satisfy a specific market need in a profitable manner [33]. Second, the infancy of the sustainable entrepreneurship sector coupled with the challenges and the financial burdens implied by environmental technologies may determine greater technical and managerial complexity, which may further increase the uncertainties surrounding these new ventures about their ability to create and capture market value [5]. Finally, environmentally oriented businesses usually require significantly high capital due to the high R&D expenditures [5]. As a result, according to this literature stream, professional investors may have less incentive to invest in environmental sustainability-oriented new ventures, as compared with their non-environmentally oriented counterparts [10].

Other studies contrast the above view in light of the growing trends toward more environmentally sustainable entrepreneurship driven by the increasing concerns toward scarcity of natural resources, pollution and global warming [11]. The investments in environmentally friendly technologies have indeed grown significantly in recent years [5]. In this regard, some studies suggest that green

innovations represent a promising business, and thus may be more attractive than non-green innovations in the eyes of venture capitalists [11]. It is argued that the cost of capital should be lower for green ventures because green innovations can confer competitive advantage [34]. Accordingly, it is recently shown that entrepreneurs running a green business and jointly positioning their venture in a green sector are more likely to secure venture capital, with an estimated marginal effect of 7% [5]. In line with the latter arguments, we believe that the recent trends toward more sustainable entrepreneurship and its possibly higher business opportunities should make professional investors more prone to invest in environmentally-oriented new ventures than in those displaying no ESO. Focusing on new hardware ventures that have previously launched a reward-based CF campaign and naturally necessitate subsequent venture capital funding to scale up, we advance that the presence of ESO (vs. non-ESO) should have a positive *direct* influence on the likelihood of receiving this additional type of funding. Hence, we formulate our second hypothesis as follows:

Hypothesis 2 (H2, direct effect): For new hardware ventures that have engaged in reward-based CF and necessitate subsequent venture capital funding, the likelihood of receiving this additional type of funding is, ceteris paribus, higher for new hardware ventures exhibiting ESO than for their non-environmentally oriented counterparts.

The above hypothesis captures the direct effect of the presence of ESO (vs. non-ESO) on the likelihood of receiving subsequent venture capital funding from professional investors. However, since the new hardware ventures of our interest have engaged in reward-based CF campaigns before any potential subsequent funding, there may also exist an indirect effect associated with the presence of ESO. There is considerable evidence that a positive performance in CF can be beneficial for new ventures in search of supplemental capital [18], [35] and/or favor market success [32], [36]. The main theoretical arguments behind the positive effect of the CF performance on the likelihood of receiving subsequent venture capital is that reward-based CF can work as a signal that mitigates the uncertainty regarding the market potential of a new entrepreneurial project [18], [26], [32], [37].

The fact that new venture's ESO is theorized to negatively influence the performance in reward-based CF (our hypothesis *H1*) and that, in turn, the latter has a signaling role in the eyes of subsequent professional investors hints at the possible existence of a negative mediating role of the performance in reward-based CF in the relationship between new venture's ESO (vs. non-ESO) and subsequent access to venture capital funding. Indeed, in our hypothesis *H1* we have argued that new hardware ventures focusing on environmental sustainability should be less attractive to the crowd than their non-environmentally oriented counterparts, determining a comparatively inferior performance as well as lower odds of success in the campaign. In turn, in light of the positive signaling role of reward-based CF performance on subsequent venture capital funding attainment, the lower performance in reward-based CF should reflect in reduced chances of securing subsequent funding from professional investors, thus implying a negative indirect effect of the presence of ESO (vs. non-ESO) on the likelihood of receiving funding from this type of investors. In other words, the lower performance in reward-based CF of new hardware ventures exhibiting ESO will have negative repercussions, lowering their likelihood of subsequent venture capital financing as compared with their non-environmentally oriented counterparts, given that the signal coming from the CF campaign is worse for the former ventures. Accordingly, we advance that, besides the positive direct effect theorized in our hypothesis *H2*, there should emerge a negative indirect effect of the presence of ESO mediated by the CF performance, due to the signaling function of this new funding channel. Hence, we formulate our third hypothesis as follows:

Hypothesis 3 (H3, mediated effect): For new hardware ventures that have engaged in reward-based CF and necessitate subsequent venture capital funding, the effect of the presence of ESO (vs. non-ESO) on the likelihood of receiving subsequent venture capital funding is negatively mediated by their performance in reward-based CF.

Figure 1 summarizes the negative mediation model we aim to test.

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3 Data and methods

3.1 Sample

To test our hypotheses, we collected data on a sample of early-stage technology ventures that have been founded in a period 2005-2014 and have launched campaigns in the category Hardware of the most popular reward-based CF platform, i.e., Kickstarter, starting from its inception in 2009 to the end of 2014. We considered new ventures that launched campaigns until the end of 2014 and concluded our observation period post CF campaign on October 2018 because a sufficiently long period of observation after the CF campaign is clearly necessary to gather reliable information about the possible attainment of subsequent venture capital funding. Otherwise, our analyses would be biased due to the presence of too recent ventures, which by definition are less ‘at risk’ of receiving subsequent VC funding. It is indeed largely recognized that professional investors tend to provide the first round of financing mostly within the first two-five years of the venture’s life [38]. Ensuring a period of at least four years after the CF campaign is therefore in line with prior studies and helps significantly mitigate the risk of biased results. Moreover, the fact that our period of observation ended on October 2018 implies that, while the CF campaigns refers to a period until 2014, all the remaining data are updated until almost the end of 2018 when examining the likelihood of securing subsequent venture capital funding.

We use campaigns from Kickstarter because this platform has been largely considered in prior CF literature focusing on environmental sustainability [8], [14], [15], and thus results obtained in this context allows broad comparison. More importantly, as highlighted earlier, we focus on new hardware ventures because, for this type of ventures, CF money is largely insufficient to fully support the growth process, which instead requires the injection of large amounts of capital [18]. As a matter of fact, the Hardware category on Kickstarter includes manufacturing applications such as consumer electronics, 3D printers, Internet of Things devices, drones, smart sensors, and robotics, which all require large investments for the setting up of prototyping, engineering, manufacturing, and distribution processes. Therefore, these new ventures really need to complement the amount possibly

collected through reward-based CF with subsequent external funding from professional investors to scale [19]. This makes the Hardware category on Kickstarter the most suitable template to our scopes. Moreover, reward-based CF has become very prominent for new hardware ventures [26]. This is because raising money on CF platforms helps validate their market prospects and increase the chances of attracting subsequent funding from professional investors [18], [32]. Indeed, it is well known that traditional investors are reluctant to invest in hardware new ventures, as compared to software ones, due to the higher investment and time required by the former to scale up the business, which makes the investment too risky [26]. As a consequence, many hardware new ventures nowadays approach the CF channel for gathering initial funding and providing evidence of a potential demand to professional investors who can then offer supplemental capital that favors scaling up.

Therefore, focusing on this important category of new ventures mitigates already the risk of including in the sample new entrepreneurial projects not seeking additional capital after CF [18], [19]. Nevertheless, we further reduce this risk by excluding from the initial 619 campaigns related to hardware ventures founded in 2005-2014 and that launched a campaign until 2014, very small projects, which do not seek sufficiently high amount of money. Indeed, besides attracting new technology-based entrepreneurial ventures (either environmentally or non-environmentally oriented), Kickstarter also hosts a multitude of very small projects, which are never potential targets of subsequent investors because of their non-entrepreneurial nature [14], [18], [19]. Of course, the majority of them were already not considered in the initial sample because they were not established as firms, being simply recreational projects. Still, it was necessary to remove the remaining projects that were too small to get attention from professional investors. Therefore, in line with prior literature [14], to avoid potential bias concerns, we considered only projects setting a goal (i.e., the declared money target a project proponent aims to collect) at least equal to \$5,000, reducing the initial sample to 593 new hardware ventures. In Section 5, we discuss the issues associated with setting a threshold on the goal and show robustness of our results when the threshold is set on the amount pledged (i.e., the amount reached in the campaign).

We also excluded from the sample 14 hardware ventures that were no longer alive at the end of our period of observation (dated October 2018) to rule out the survival as a possible cause of subsequent financing from professional investors. Finally, it was also necessary to eliminate 71 new hardware ventures for which CF came after funding from professional investors, thus not allowing to test the mediation model for these ventures by definition. At the end, we were left with 508 new hardware ventures, which were founded in years 2005-2014, launched a CF campaign on Kickstarter in the period 2009-2014 with a goal equal or higher than \$5,000, and were observed until October 2018. Before describing the variables, we remark that our hypotheses concern new hardware ventures that engage in reward-based CF and, due to their nature, may call for subsequent funding rounds for scaling up. Therefore, our sample includes only these new ventures and our conclusions are reflections of our objective of examining the triple relationship among ESO, reward-based CF, and venture capital funding attraction for these new ventures.

3.2 Variables

Main variables

Like [14], the performance in the CF campaign is measured using two alternative variables, which helps increase robustness of our findings. Specifically, we consider the amount pledged in the CF campaign (the variable *Pledged Amount*), namely the amount of money reached at the end of the campaign irrespective of whether the goal has been met or not (similarly to [14], we take the logarithmic transformation of the variable *Pledged Amount* because of its skewness).

This variable has been utilized as measure of campaign performance in a number of CF studies, especially those focusing on the role of reward-based CF in stimulating funding from professional investors [18]. This is because, by representing the total commitments from campaign contributors who are mostly consumers interested in gaining early access to the product, such variable provides a reliable indication of the market prospects of new ventures using reward-based CF [18]. At any rate, to show robustness of results, we also consider a dummy variable (*Crowdfunding Success*) indicating whether the campaign has been successful or not, i.e., whether the amount pledged in the campaign

has equalized or exceeded the campaign goal. The data regarding these two variables of CF performance are retrieved directly from Kickstarter. Note also that these variables are used as dependent variables to test our hypothesis *H1*, whereas are used as independent variables to test hypotheses *H2* and *H3*.

The dependent variable we introduce to test hypotheses *H2* and *H3* is a dummy variable (namely *Subsequent Venture Capital Funding*) equal to one if the given new venture has received any type of funding from professional investors, ranging from seed stage to later venture capital investments; zero otherwise. As mentioned earlier, we observed whether a new venture had received venture capital funding from professional investors until October 2018, ensuring a sufficiently long time span for a subsequent round of financing from professional investors to possibly occur, in line with prior similar studies [18]. We gathered data about traditional venture funding rounds secured after the CF campaign by accessing ThomsonOne-VentureXpert and CrunchbasePro databases. Also, to ensure consistency of our data, we checked other databases providing information on new ventures and their funding rounds, such as Angel.co, as well as the press section on the website of each new venture.

Finally, we introduce the dummy variable *ESO* taking the value of one if the new venture displayed the presence of factors characterizing environmental sustainability such as green products and/or processes that would benefit the environment, the nature and the Earth's life support systems; zero otherwise. This variable was constructed through an assessment procedure involving three experts carefully informed about the objectives of our research, but not communicating with each other. In identifying the factors characterizing environmental sustainability, we instructed the experts to strictly refer to the definitions provided by the U.S. Bureau of Labor Statistics (<http://www.bls.gov/green/>) in assessing the projects, as done for instance in [5]. According to this classification, projects involving products or processes controlling and/or reducing pollution as well as the consumption of natural resources, promoting energy efficiency, favoring the use of renewable energy, making recycling easier, creating the conditions for a cleaner environment (spaces, air, water, etc.), and improving the hygiene and health conditions of people and animals were considered as

having ESO. This approach is similar to that used in [14]. At the same time, we relied on the stringent requirements imposed by Kickstarter for launching a hardware campaign on their platform (<https://www.kickstarter.com/rules/prototypes?ref=rules>). As project proponents are required to provide very detailed information, it becomes easier to retrieve information on ESO from the description of the project and the presentation videos. Finally, we also relied on the experience of our coders in assessing ESO. In line with prior studies (e.g., [14]), each coder was instructed to read the project descriptions, review project videos, and code each project with 1 or 0 for ESO. Coders completed their work within four weeks. Like [14], we calculated Cronbach's alpha across the three coders to measure inter-rater reliability [39]. This measure was 0.79, falling above an acceptability threshold of 0.70 commonly found in the entrepreneurship literature [40]. In the cases of disagreement among the coders, the natural majority rule (two out of three) was utilized.

Control variables

In addition to the variables of interest, in line with the prior literature, we control for relevant quality aspects of the new venture by including the set of characteristics normally utilized by investors to assess technology startup quality (including those with environmental orientation), namely intellectual, social, and human capital [41], [5].

Note that, although the same control variables can be used for testing both hypothesis *H1* (when the performance in CF is the dependent variable) and hypotheses *H2* and *H3* (when the dummy variable *Subsequent Venture Capital Funding* is the dependent variable), they should refer (when reasonable) to different periods to eliminate the risk of reverse causality. That is, in the first case, they should be computed at the time of the launch of the CF campaign, whereas in the second case they should be computed right before the subsequent funding from professional investors was received or within an equivalent period for new ventures that did not receive subsequent funding. We adopt this procedure, which however generates a difference in the actual values used for the analysis only for the patents granted to the new ventures. This is because there are several occurrences where patents were granted after the CF campaign. All other variables have instead the same values irrespective of the considered

dependent variable because either they are time invariant or did not change after the CF campaign. The only exception is the variable average industry experience of the entrepreneurial team, which is always computed at the year of 2014 for the sake of convenience given that this variable straightforwardly increases over time for all entrepreneurs. Our results are robust even when this variable is computed similarly to the other variables.

Combining data from LinkedIn and the above mentioned venture capital databases, we take into account the entrepreneur human capital and control for the entrepreneurial team's educational background by means of two variables, i.e., whether at least one member of the entrepreneurial team has received an MBA (*MBA*) and whether at least one of member of the entrepreneurial team has received a Ph.D. (*PhD*) [42]. In line with prior studies on new venture financing [43], we also control for the average industry experience of the entrepreneurial team (*Average Industry Experience*) and for whether at least one team member has founded previous new ventures in the past (*Previous New Ventures*). This is because the skills acquired from past entrepreneurial experiences may naturally influence entrepreneurs' ability to manage their current ventures [41]. The variable *Size of the Entrepreneurial Team* is also introduced to broadly capture the amount of human capital [41]. We also control for the presence of women in the entrepreneurial team by introducing the dummy *Women*. We control for the effect of the variable *Entrepreneur Past Successful Funding Experience*, taking the value of one if at least one member of the given new venture has received funding from professional investors for previously founded new ventures and/or such previous new ventures have been successfully sold to established firms; zero otherwise. This variable informs professional investors on whether the entrepreneurial story of the team has been successful in the past, thus providing again a valuable quality indication on the entrepreneurial ability [41]. The variables *Size of the Entrepreneurial Team* and *Entrepreneur Past Successful Funding Experience* are also useful to control the entrepreneur social capital. Indeed, larger management teams are not only likely to possess higher human capital, but at the same time, they may have more social capital as the number of social connections tends to increase with the number of team members [41]. Similarly, the ability to secure

funding from professional investors for past ventures also enhances the entrepreneurial team's social capital, because former relationships with professional investors facilitate access to suppliers, customers, professionals and thus to a broader network of ties and strategic resources [44].

Finally, retrieving information from USPTO database, we control for the effect of patents granted for the given product idea, before and after the CF campaign, using the dummies *Patents before Crowdfunding* and *Patents after Crowdfunding* [43] for testing hypotheses H1 and H2-H3, respectively, since, as explained above, in our sample some patents were granted before CF and others after it. Similarly to [43], we also recognize that new ventures located in different geographic areas may face a different probability of securing capital because the availability of capital across different geographical regions varies significantly. Thus, we include a dummy variable (*Top Startup Areas*), equal to one if the new venture is located in the metropolitan area of one of the top 20 cities worldwide for establishing and nurturing a startup, according to the Startup Genome Report [45]; zero otherwise. Finally, we control for the year of new venture establishment by introducing ten dummies (*Year of Establishment 200x*), which help control for the different stages of new ventures' lifecycle.

Descriptive statistics

The descriptive statistics regarding all variables for our sample of 508 new hardware ventures are reported in Table 1. In line with prior studies [14], it can be noted that 9% of the new ventures considered in our sample exhibit ESO, whereas approximately 70% have succeeded in CF and almost 20% have received subsequent venture capital funding from professional investors after the CF campaign. The magnitude of the latter two statistics further reassures us on the fact that the threshold set on the goal for project selection is actually effective in excluding projects not displaying a minimum level of quality and/or having non-entrepreneurial nature (e.g., recreational projects). These projects are indeed by definition less likely to both succeed in CF and attract subsequent venture capital funding.

The mean pledged amount slightly exceeds \$150,000, which suggests that reward-based CF operates as a seed capital channel. Regarding the control variables, Table 1 confirms that entrepreneurial teams

characterized by the presence of MBA, PhD, women, past successful funding experience, and patents are not so common. Moreover, due to the rapid growth of the CF phenomenon, it is not surprising that most new ventures using CF have been founded in the last years considered in our sample.

In Table 2, we report the correlation matrix, which suggests no serious degree of correlation between the variables employed in this study. This is confirmed by the fact that the Variance Inflation Factor (VIF) computed after performing our regression models is less than 10 for the variables included in our analysis (VIF results can be made available by authors upon request).

4 Empirical results

We present the results of our analysis and unravel the effects of the presence of ESO on CF performance and on the odds of securing subsequent capital from professional investors, where the latter effect should be partially (and negatively) mediated by the performance in CF. Given the cross-sectional nature of our dataset, we use robust OLS or probit regression models depending on whether the dependent variable is continuous (i.e., *Pledged Amount*) or dichotomous (i.e., *Crowdfunding Success* and *Subsequent Venture Capital Funding*).

To test the mediating role of CF performance we follow a variant of the approach proposed in [46], in light of the fact that we have hypothesized negative mediation [47]. Specifically, a) we first test the effect of the presence of ESO on CF performance in order to support our hypothesis *H1*. Then, b) we test the effect of the presence of ESO on the likelihood of securing subsequent venture capital from professional investors, without controlling for the CF performance. Finally, c) we test again this effect, but now controlling for the effect of the CF performance in order to disentangle the direct and mediated effects of ESO on the odds of securing subsequent venture capital. Compared with the original procedure in [46], we invert the sequence of tests a) and b) to follow our sequence of hypotheses. Obviously, this has no effect on results, as they are separate regressions, according to [46]. In Section 5 we demonstrate robustness of our results also using Hayes PROCESS macro and generalized structural equation modeling.

Note that we have hypothesized a negative mediation (often referred in the literature as *suppression* [47]) through the CF performance. Therefore, it is important to underscore that the overall effect of the presence of ESO (vs. non-ESO) on the odds of receiving venture capital funding is weakened, and thus may even become insignificant, if the performance in CF is not controlled. That is, the (negative) mediation can exist even in the case of insignificance of the variable of interest when the mediator is excluded, as largely discussed in the literature [47]. Accordingly, our arguments behind hypotheses *H2* and *H3* advance that there exist both direct and mediated effects, with the former being positive and the latter being negative.

Table 3 reports the results regarding hypothesis *H1*. Specifically, the first column reports the results when the CF performance is measured using the amount pledged in the campaign, whereas the second column shows the results when the dummy *Crowdfunding Success* is utilized. The effect of the presence of ESO (vs. non-ESO) is shown to negatively and significantly (at the 5% level) affect the CF performance under both measures. This confirms the arguments behind our hypothesis *H1* that new hardware ventures focusing on environmental sustainability should display a lower performance in reward-based CF, as compared with their non-environmentally oriented counterparts. As explained, this finding is arguably due to the fact that, for tangible technology products, campaign contributors are essentially early adopters interested in acquiring the ownership of a good that satisfies a concrete individual need, either utilitarian or hedonic, rather than seeking environmental sustainability attributes.

Table 3 also reports the results regarding hypothesis *H2* and *H3*. First, note that in examining these hypotheses we need to consider also new hardware ventures that launched a reward-based CF campaign but failed to reach the targeted amount, thus collecting no CF money. If we removed such ventures from the analysis, we would arbitrarily eliminate ventures that, although failing in CF, may still seek and even receive venture capital funding. In turn, we would systematically end up using only those new hardware ventures successful in CF, with the consequence of possibly biasing downward the effect of the CF performance on the likelihood of securing subsequent venture capital

funding, and incorrectly weakening the potential mediation effect. Moreover, the exclusion of these ventures would also prevent us from using the variable *Crowdfunding Success* as an independent variable because there would not be any variation in this variable after eliminating ventures failing in reward-based CF. Therefore, we do consider these ventures.

The third column of Table 3 reports the results when the dummy *ESO* is included in the regression model in addition to the control variables, but no measure of CF performance is introduced. In the fourth and fifth columns, we add the variables *Pledged Amount* and *Crowdfunding Success*, respectively, in addition to the dummy *ESO* and the control variables. The effect of the control variables is consistent with prior studies. More importantly, the effect of our variables of interest is consistent with our hypotheses. Indeed, the third column shows that, when the variable *ESO* is introduced and CF performance measures are excluded, the effect of the former is insignificant. According to the methodological literature on negative mediation [47], this is because, in the absence of the mediator (i.e., the CF performance measure), the dummy *ESO* captures both direct and (negatively) mediated effects leading to overall insignificance, given that these effects are conflicting as our arguments suggest. The fourth and fifth columns show that when the CF performance measure is added (*Pledged Amount* and *Crowdfunding Success*, respectively), the direct effect of the variable *ESO* (captured by the relative coefficient) becomes positive and significant as the mediating effect is now disentangled. This confirms our hypothesis *H2*, suggesting that the presence of *ESO* for new hardware ventures using reward-based CF would *per se* increase their odds of receiving subsequent funding from professional investors. This is in line with the recent view that green innovations may be more attractive than their non-green counterparts in the eyes of venture capitalists [5].

Combining the results of all columns in Tables 3, we provide support to our hypothesis *H3* as well. Indeed, consistent with prior studies (e.g., [18]), Table 3 shows that the performance in CF is positively associated with the likelihood of securing subsequent funding from professional investors. On the other hand, first and second columns of Table 3 also show that the presence of *ESO* reduces the CF performance of new hardware ventures using this funding channel for initial capital search.

Furthermore, the last three columns of Table 3 show that the positive direct effect of the presence of ESO on the likelihood of securing subsequent funding from professional investors emerges when the CF performance (the negative mediator) is accounted for, while it is obscured when we do not control for this factor (leading to insignificant coefficient of the variable *ESO*). Consistently, it is also noteworthy that the magnitude of the coefficient of the variable *ESO* is lower when the negative mediator is not introduced than in the case where it is controlled. Therefore, the presence of ESO has also an indirect negative effect on the odds of receiving subsequent venture capital for new hardware ventures, via its negative influence on the performance in CF.

5 Robustness checks

In this section we provide a number of robustness checks that increase the reliability of our results. First, we checked whether the results obtained using the Baron-Kenny approach were robust to a change in the econometric method. Specifically, we tested our mediation model running the Hayes PROCESS macro with bootstrapping. Given that dichotomous mediators are not allowed in the Hayes PROCESS macro, we only used the variable *Pledged Amount* for measuring the CF performance. Table 4 reports the output of this mediation model. Results in the first column of Table 4 show that the dummy *ESO* negatively and significantly affects the CF performance, thus confirming again our hypotheses *H1*. From the second column of Table 4, the direct effect of the presence of ESO on the likelihood of securing subsequent venture capital funding (i.e., the effect of the presence of ESO when controlling for the CF performance) is positive and significant as before. This provides support to our hypothesis *H2*. It is also shown that the performance in CF positively and significantly affects the likelihood of securing subsequent venture capital funding. Finally, the bottom of Table 4 illustrates that, consistent with the results obtained using the Baron-Kenny approach, both direct and indirect effects of the presence of ESO emerge as significant and they oppose each other (the total effect is, however, not provided by the Hayes PROCESS Macro under probit models). In particular, the direct effect of the presence of ESO on the likelihood of receiving subsequent venture capital

funding is positive and significant, whereas the effect of the presence of ESO mediated through the CF performance is negative and significant. Hence, our hypothesis *H3* is once again supported.

To further check robustness we also performed a path analysis using generalized structural equation modeling (GSEM) without latent variables. The results under this model are reported in Table 5, where the first two columns provide the output of the mediation models that include the variable *Pledged Amount*, whereas the last two columns report the same output when the dummy *Crowdfunding Success* is used. Even in this case the results are consistent with those obtained in Tables 3 and 4. In particular, it is shown at the bottom of Table 5 that direct and indirect effects are significant and oppose each other by determining an insignificant total effect, which further documents robustness of our findings.

Finally, we checked the robustness of our results to a change in the threshold for inclusion in our sample. So far we used the goal as a threshold for inclusion. This is consistent with prior literature [14], and intuitively helps restrict only to projects that are likely to call for subsequent venture capital funding. However, a threshold on the goal might imply removing from the sample projects of potential interest for professional investors. In fact, while the goal may indicate the amount of capital needed by the entrepreneur to support at least the very initial stages of the project, the fact that Kickstarter utilizes an all-or-nothing mechanism (i.e., the money is actually transferred to the entrepreneur only if the goal is reached) gives the incentive to hardware entrepreneurs to lower the goal to increase the probability of receiving the money. Therefore, more risk-averse entrepreneurs may lower the goal to a greater extent than less risk-averse entrepreneurs [18]. This implies a risk of disregarding entrepreneurial hardware projects relevant to our scopes that set a low goal just because of the all-or-nothing mechanism utilized by Kickstarter. For this reason, we now check robustness of our findings using the threshold on the pledged amount rather than on the goal. Being the response of campaign contributors, the pledged amount is not affected by the concern above.

Adopting this threshold for inclusion actually reduces the number of new ventures to 469. Table 6 reports the results of the same regression models presented in Table 3. The results remain qualitatively

the same, with only one small difference. In Table 6, there emerges a positive and significant effect of the variable *ESO* on the likelihood of receiving subsequent venture capital, even when the CF performance is not controlled. However, the significance level (10% versus 5%) and the magnitude of the coefficient of this variable (0.46 versus 0.59 and 0.54) are much lower in this case than in the case where the performance in CF is controlled. The difference is due to the fact that a threshold on the amount pledged rather than on the goal tends to increase the percentage of successful hardware projects in CF (78% versus 70% in our sample), naturally attenuating the negative mediating effect and thus giving more room to the positive direct effect to manifest. At any rate, as the presence of *ESO* (vs. non-*ESO*) still has a negative impact on CF performance and such performance is positively correlated to the odds of securing subsequent venture capital, this implies that both direct and mediated effects are at work and oppose each other.

6 Discussion and conclusion

In this paper we have examined how the feature of *ESO* may influence new hardware ventures' ability to secure funding in reward-based CF campaigns and how the performance in this funding channel mediates the effect of the presence of such feature on the likelihood of receiving subsequent funding from professional investors.

Our findings are as follows. First, we corroborate prior evidence (e.g., [8]), by documenting that new hardware ventures exhibiting *ESO* display lower CF performance than their non-environmentally oriented counterparts. While previous research has explained results mainly considering the economic theory of rational choice and the financing of public goods, we complement these views by also adding an "investor-as-consumer" perspective. Second, we reveal that for new hardware ventures using reward-based CF, the presence of *ESO* (vs. non-*ESO*) has a surprisingly dual effect on the likelihood of securing venture capital funding after CF. It has a direct positive effect. However, it also has a negative indirect effect due to its negative impact on the CF performance, which is instead positively associated with the likelihood of receiving subsequent venture capital funding. That is, through this mediation path, the presence of *ESO* (vs. non-*ESO*) reduces the CF performance, and

thus also reduces the access to subsequent venture capital funding. As a result, for new hardware ventures using reward-based CF, the net effect of the presence of ESO on securing this subsequent type of funding may be insignificant, or at most attenuated.

Our results have remarkable implications for both theory and practice. We provide simultaneous evidence on the triadic relationship among ESO, reward-based CF, and venture capital funding. On the contrary, extant literature has investigated the effects of new ventures' ESO on the CF performance and on the ability to secure venture capital, separately. We document opposite financing reactions of crowdfunders and professional investors to the ESO vs. non-ESO feature of new hardware ventures. While it is not surprising that that different types of funders (crowdfunders and professional investors) may have different objectives, leading to different outcomes in terms of likelihood of securing finance, what comes as a surprise is that, at least for new hardware ventures engaging in reward-based CF for initial capital, subsequent professional investors are more sensitive to ESO than consumers contributing to the campaign (i.e., crowdfunders), thus overturning the common belief of an ethical consumer-sovereignty able to save the world. In fact, our findings show that consumers in a reward-based CF context are not always sensitive to sustainability issues. Indeed, reward-based CF may affect the ways consumer behaviors are framed (i.e., reward-based CF is a channel for early access to products), thus impacting on their investment/purchase choices (i.e., early adopters of new technology products tend to be influenced in their choices by other than environmental attributes). In contrast, as recent trends suggest, our results regarding the direct effect of the presence of ESO on subsequent venture capital funding show that professional investors are more prone than CF contributors to invest in new hardware ventures exhibiting ESO rather than in their counterparts.

Our study also contributes by using an investor-as-consumer theoretical lens to understand the underlying dynamics behind the mediation role of reward-based CF in the relationship between the presence of ESO and the attainment of venture capital funding [24], [25], [20]. We suggest that, in the case of technology-based products, in order to understand the decision of providing finance or

not, it is pivotal to refer to the consumer nature of the investors. As explained earlier, crowdfunders of innovative technology products can be assimilated to early adopters, who are more influenced in their financing (and consumption) decisions by private utilitarian/hedonic benefits, rather than environmental attributes. In this regard, we also provide support to the rational choice theory [21], by revealing that investors in reward-based CF tend to behave rationally. Specifically, reinterpreting our findings also in light of this theory, CF investors have less incentive to invest in new ventures providing, comparatively speaking, more “public good” benefits (e.g., goods protecting and preserving the environment). This is because, compared with products conferring mostly private benefits, the benefits of products that have large portion of “public good” features will also be available to those who did not contribute to fund the project, thus naturally determining underinvestment for the latter type of products [23].

Finally, we further enhance understanding of signaling theory in CF. In particular, while the informative role of reward-based CF performance in the eyes of subsequent investors has been underscored by a number of studies [18], [19], we are the first to inform about the nontrivial consequences of this signaling role as a mediating factor between other important features of new ventures (e.g., the presence of ESO) and subsequent funding from professional investors. We explain that this mediation role can be detrimental when the given venture characteristic (e.g., the presence of ESO) negatively affects the signaling source (i.e., the CF performance) and the effect of the signal (e.g., a bad or good CF outcome) influences the receiver’s decision (e.g., venture capitalists). As a matter of fact, the negative mediating role of reward-based CF in the relationship between the presence of ESO and the attainment of subsequent venture capital funding derives from combining the negative effect of this venture’s feature (ESO vs. non-ESO) on the reward-based CF performance and the positive signaling role of the latter on the likelihood of securing the subsequent funding. Interestingly, we also document that this detrimental effect emerges to counterbalance the beneficial effect the given new venture feature (i.e., the presence of ESO) would have *per se* on the final receiver, i.e., professional investors.

As for practice, our results imply that new hardware ventures focusing on environmental sustainability issues should factor in the type of contributors accessing reward-based CF platforms and design their campaign accordingly. Concerning the communication strategy when launching a reward-based CF campaign, they could try to stress more the aspect of individual and immediate consumption benefits connected to their products, in addition to the environmental objectives. That is, project creators should describe product attributes that are positive for the environment and link those benefits to more private utilitarian/hedonic benefits sought by early adopters (e.g., efficacy and experience of usage), thus better balancing between more “public good” benefits and “private consumption” ones. They could also design the rewards scheme by offering rewards and products more in line with the individual consumption needs of contributors accessing these platforms.

The implementation of these strategies would help reduce the CF performance gap with new ventures not oriented to environmental sustainability, reducing the consequential negative mediating effect of reward-based CF performance. In turn, the reduction of this mediating effect would comparatively enhance the access to subsequent funding from professional investors, as the direct effect of the presence of ESO on these investors is beneficial. Our study also informs professional investors that, in their funding decisions of new hardware ventures that have previously utilized the reward-based CF channel, they should disentangle the disadvantage deriving from the indirect (i.e., through CF performance) effect of ESO to evaluate its pure benefit.

There are certainly some limitations in the present study, which offer opportunity for future research. First, whether a campaign has a future-focus orientation in the communication with crowdfunders is a characteristic that has been shown to negatively influence CF performance [25]. In principle, this characteristic could be a confounding factor for our first hypothesis. However, we conjecture that this characteristic may be actually a consequence of ESO. It is indeed more likely that ESO projects description will include future-oriented terms because the main environmental/social benefits pursued by these projects tend to manifest in the long-term. That is, ESO could negatively influence CF performance *per se* (direct effect of ESO) due to the intrinsic characteristics we discuss in the

paper as well as incentivize a more future-focus type of communication that, in turn would further impact negatively on CF performance (indirect effect of ESO). Therefore, without controlling for the future-focus orientation in the current study, we simply capture these direct and indirect effects of ESO together, without distinguishing them. The full investigation of the relationships among ESO, future-focus orientation, and CF performance is a promising research direction. Second, our study considers only new technology-based ventures (hardware, in particular), thus preventing the study of how the product category (or even the industry) would moderate the role of the presence of ESO (vs. non-ESO) on both CF and venture capital funding performances. The study of moderating effects, such as the product category, is worth future research. Finally, as explained earlier, we have focused on new hardware ventures using CF and thus our considerations are valid only in this context. Future studies could examine the effects of the presence of ESO when considering also new hardware ventures that did not engage in reward-based CF.

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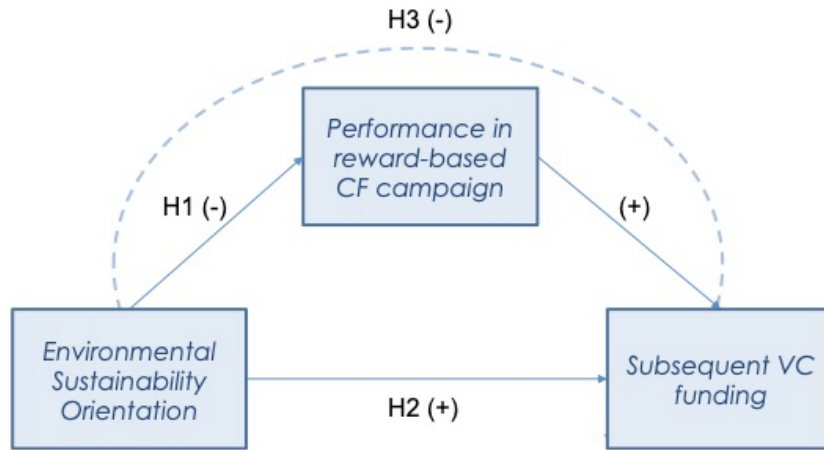


Figure 1. The negative mediation (i.e., suppression) model

Table 1. Descriptive statistics for our sample 508 new hardware ventures

Variables	Mean	Std. Dev.	Min	Max
Subsequent Venture Capital Funding	0.197	0.398	0	1
Pledged Amount (\$)	157018	330221	37	3400000
Crowdfunding Success	0.701	0.458	0	1
Goal (\$)	90837	254011	5000	5000000
ESO	0.093	0.290	0	1
Top Startup Areas	0.470	0.500	0	1
Average Industry Experience	8.007	6.416	0	35
MBA	0.108	0.311	0	1
PhD	0.138	0.345	0	1
Size of the Entrepreneurial Team	1.596	0.895	1	6
Women	0.096	0.300	0	1
Previous New Ventures	0.421	0.494	0	1
Entrepreneur Past Successful Funding Experience	0.089	0.284	0	1
Patents after Crowdfunding	0.031	0.175	0	1
Patents before Crowdfunding	0.006	0.077	0	1
Year of Est. 2005	0.026	0.158	0	1
Year of Est. 2006	0.024	0.152	0	1
Year of Est. 2007	0.035	0.185	0	1
Year of Est. 2008	0.039	0.195	0	1
Year of Est. 2009	0.067	0.250	0	1
Year of Est. 2010	0.110	0.313	0	1
Year of Est. 2011	0.150	0.357	0	1
Year of Est. 2012	0.264	0.441	0	1
Year of Est. 2013	0.197	0.398	0	1
Year of Est. 2014	0.089	0.284	0	1

Table 2. Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
(1) Subsequent Venture Capital Funding																									
(2) Pledged Amount (\$)	0.34*																								
(3) Crowdfunding Success	0.20*	0.63*																							
(4) Goal (\$)	0.21*	0.25*	-0.30*																						
(5) ESO	0.05	-0.10*	-0.09*	0.05																					
(6) Top Startup Ecosystems	0.08	0.12*	0.06	0.05	-0.00																				
(7) Average Industry Experience	-0.12*	-0.06	-0.13*	0.12*	0.03	0.01																			
(8) MBA	0.05	0.03	-0.02	0.11*	0.02	-0.01	0.02																		
(9) PhD	0.16*	0.07	-0.01	0.03	0.05	-0.06	0.00	-0.03																	
(10) Size of the Entrepreneurial Team	0.31*	0.28*	0.17*	0.10*	-0.02	0.07	-0.07	0.14*	0.19*																
(11) Women	0.05	0.02	0.02	0.01	-0.01	0.09*	-0.12*	0.12*	0.00	0.24*															
(12) Previous New Ventures	0.13*	0.05	0.02	0.08	0.07	0.03	0.16*	0.09*	-0.02	0.20*	0.06														
(13) Entrepreneur Past Successful Funding Experience	0.21*	0.22*	0.11*	0.17*	0.02	0.07	0.18*	0.00	0.04	0.11*	-0.05	0.35*													
(14) Patents after Crowdfunding	0.22*	0.13*	0.04	0.10*	-0.02	0.06	0.12*	0.01	-0.01	0.01	-0.06	0.03	0.14*												
(15) Patents before Crowdfunding	0.16*	0.01	-0.01	0.03	-0.02	0.03	0.09*	-0.03	-0.03	-0.05	-0.03	0.04	0.07	0.43*											
(16) Year of Est. 2005	-0.05	-0.00	-0.00	-0.03	0.03	0.02	0.15*	-0.02	0.01	-0.07	-0.01	-0.01	0.08	0.04	-0.01										
(17) Year of Est. 2006	-0.01	0.05	0.07	0.01	-0.00	0.04	0.07	0.03	-0.02	0.01	-0.01	0.05	-0.00	0.05	-0.01	-0.03									
(18) Year of Est. 2007	-0.01	-0.05	-0.04	0.00	0.05	0.03	0.12*	-0.07	-0.01	-0.04	-0.06	0.01	0.13*	0.21*	0.26*	-0.03	-0.03								
(19) Year of Est. 2008	0.03	-0.02	-0.04	0.13*	0.11*	0.09*	0.12*	-0.01	0.07	-0.06	-0.03	-0.05	-0.03	0.02	-0.02	-0.03	-0.03	-0.04							
(20) Year of Est. 2009	-0.01	0.02	0.09*	0.04	0.05	0.00	0.04	-0.02	0.01	-0.04	-0.01	0.04	-0.00	0.04	0.08	-0.04	-0.04	-0.05	-0.05						
(21) Year of Est. 2010	-0.08	-0.01	-0.03	-0.03	0.02	-0.02	0.08	-0.06	0.04	0.01	-0.01	0.01	-0.07	-0.03	-0.03	-0.06	-0.05	-0.07	-0.07	-0.09*					
(22) Year of Est. 2011	0.04	0.05	0.01	0.02	-0.02	-0.02	0.03	0.07	-0.02	0.10*	-0.10*	-0.00	0.02	0.02	-0.03	-0.07	-0.07	-0.08	-0.08	-0.11*	-0.15*				
(23) Year of Est. 2012	0.05	0.01	0.07	-0.10*	-0.04	-0.07	-0.08	-0.04	-0.03	0.01	0.03	-0.08	-0.03	-0.06	-0.05	-0.10*	-0.09*	-0.11*	-0.12*	-0.16*	-0.21*	-0.25*			
(24) Year of Est. 2013	0.03	-0.01	-0.08	0.04	-0.02	-0.00	-0.15*	0.03	0.03	0.01	0.12*	0.02	0.02	-0.09*	-0.04	-0.08	-0.08	-0.09*	-0.10*	-0.13*	-0.17*	-0.21*	-0.30*		
(25) Year of Est. 2014	-0.05	-0.03	-0.04	-0.01	-0.08	0.04	-0.10*	0.05	-0.04	-0.03	-0.01	0.06	-0.05	-0.02	-0.02	-0.05	-0.05	-0.06	-0.06	-0.08	-0.11*	-0.13*	-0.19*	-0.15*	

Table 3. Main regression models of our negative mediation framework

	<i>Crowdfunding Performance as a dependent variable</i>		<i>Subsequent Venture Capital Funding as a dependent variable</i>		
	<i>OLS regression with Pledged Amount (Ln) as a dependent variable</i>	<i>Probit regression with Crowdfunding Success as a dependent variable</i>	<i>Without including any crowdfunding performance variable</i>	<i>Including the variable Pledged Amount (Ln)</i>	<i>Including the variable Crowdfunding Success</i>
ESO	-0.588** (0.292)	-0.461** (0.210)	0.337 (0.234)	0.460** (0.231)	0.418* (0.235)
Pledged Amount (Ln)				0.271*** (0.068)	
Crowdfunding Success					0.538*** (0.195)
Goal (Ln)	0.346*** (0.074)	-0.519*** (0.070)			
Top Startup Areas	0.308** (0.144)	0.179 (0.132)	0.201 (0.143)	0.123 (0.147)	0.175 (0.144)
Size of the Entrepreneurial Team	0.473*** (0.071)	0.464*** (0.094)	0.398*** (0.083)	0.302*** (0.085)	0.364*** (0.083)
Average Industry Experience	-0.197* (0.108)	-0.283*** (0.095)	-0.050*** (0.015)	-0.039** (0.016)	-0.043*** (0.015)
MBA	-0.103 (0.262)	-0.029 (0.217)	0.030 (0.231)	0.023 (0.228)	0.044 (0.232)
PhD	0.086 (0.212)	-0.229 (0.190)	0.504*** (0.192)	0.478** (0.196)	0.525*** (0.192)
Women	-0.240 (0.256)	-0.113 (0.234)	-0.041 (0.560)	0.025 (0.243)	-0.028 (0.245)
Previous New Ventures	-0.237 (0.164)	-0.169 (0.144)	0.243 (0.156)	0.272 (0.167)	0.235 (0.159)
Entrepreneur Past Successful Funding Experience	1.151*** (0.212)	1.249*** (0.281)	0.789*** (0.267)	0.520* (0.270)	0.685*** (0.266)
Patents before Crowdfunding	0.392 (1.019)	0.351 (0.716)			
Patents after Crowdfunding			1.886*** (0.442)	1.705*** (0.432)	1.875*** (0.420)
Year of Establishment (dummies)	Included	Included	Included	Included	Included
Constant	6.828*** (0.916)	5.957*** (0.938)	-2.308*** (0.560)	-5.269*** (0.875)	2.729*** (0.527)
<i>N. obs</i>	508	508	508	508	508
<i>R² / Pseudo R²</i>	0.192	0.198	0.222	0.276	0.239

Standard errors in parentheses - * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4. Regression models under Hayes PROCESS macro

	<i>Variable Pledged Amount (Ln) as mediator</i>	
	<i>DV: Pledged Amount (Ln)</i>	<i>DV: Subsequent Venture Capital Funding</i>
ESO	-0.543** (0.254)	0.870* (0.447)
Pledged Amount (Ln)		0.635*** (0.113)
Top Startup Areas	0.316** (0.148)	0.216 (0.278)
Size of the Entrepreneurial Team	0.497*** (0.089)	0.500*** (0.149)
Average Industry Experience	-0.025** (0.012)	-0.093*** (0.030)
MBA	0.010 (0.239)	0.147 (0.412)
PhD	0.092 (0.217)	0.899** (0.356)
Women	-0.251 (0.260)	0.079 (0.436)
Previous New Ventures	-0.236 (0.163)	0.414 (0.307)
Entrepreneur Past Successful Funding Experience	1.393*** (0.281)	1.168** (0.473)
Patents	0.600 (0.985)	21.460 (826.613)
Year of Establishment (dummies)	Included	Included
Constant	10.206*** (0.500)	-10.178*** (1.760)
<i>N. obs</i>	508	508
<i>R² / Pseudo R²</i>	0.152	0.288
Summary of effects		
<i>ESO → Pledged Amount</i>		-0.543** (0.254)
<i>Pledged Amount → Subsequent Venture Capital Funding</i>		0.635*** (0.113)
<i>ESO → Subsequent Venture Capital Funding</i>		0.870* (0.447)
<i>Direct effect</i>		-0.345** (0.212)
<i>Indirect effect</i>		

Based on 1,000 bootstrap samples. Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5. Generalized Structural Equation Modelling (GSEM)

	<i>Including the variable Pledged Amount (Ln) as a mediator</i>		<i>Including the variable Crowdfunding Success as a mediator</i>	
	<i>DV: Pledged Amount (Ln)</i>	<i>DV: Subsequent Venture Capital Funding</i>	<i>DV: Pledged Amount (Ln)</i>	<i>DV: Subsequent Venture Capital Funding</i>
ESO	-0.581** (0.284)	0.460** (0.231)	-0.445** (0.210)	0.418* (0.235)
Pledged Amount (Ln)		0.271*** (0.068)		
Crowdfunding Success				0.538*** (0.194)
Goal (Ln)	0.349*** (0.072)		-0.522*** (0.070)	
Top Startup Areas	0.304** (0.141)	0.123 (0.147)	0.176 (0.132)	0.175 (0.144)
Size of the Entrepreneurial Team	0.459*** (0.070)	0.302*** (0.085)	0.449*** (0.094)	0.364*** (0.083)
Average Industry Experience	-0.030** (0.012)	-0.039** (0.016)	-0.033*** (0.010)	-0.043*** (0.015)
MBA	-0.103 (0.256)	0.023 (0.228)	-0.046 (0.217)	0.044 (0.232)
PhD	0.089 (0.208)	0.478** (0.196)	-0.225 (0.191)	0.525*** (0.192)
Women	-0.249 (0.250)	0.025 (0.243)	-0.114 (0.233)	-0.027 (0.245)
Previous New Ventures	-0.220 (0.160)	0.272 (0.167)	-0.157 (0.144)	0.235 (0.159)
Entrepreneur Past Successful Funding Experience	1.183*** (0.208)	0.520* (0.270)	1.294*** (0.290)	0.684** (0.266)
Patents after Crowdfunding		1.705*** (0.432)		1.875*** (0.420)
Patents before Crowdfunding	0.496 (0.854)		0.524 (0.662)	
Year of Establishment (dummies)	Included	Included	Included	Included
Constant	6.712*** (0.895)	-5.269*** (0.874)	5.705*** (0.914)	-2.729*** (0.527)
<i>N. obs</i>	508	508	508	508
Summary of effects				
<i>Direct Effect</i>		0.460** (0.231)		0.418* (0.235)
<i>Indirect effect</i>		-0.158* (0.085)		-0.240* (0.143)
<i>Total effect</i>		0.302 (0.253)		0.178 (0.285)

Standard errors in parentheses - * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6. Robustness check using the threshold on the *Pledged Amount* rather than on the *Goal*

	<i>Crowdfunding Performance as a dependent variable</i>		<i>Subsequent Venture Capital Funding as a dependent variable</i>		
	<i>OLS regression with Pledged Amount (Ln) as a dependent variable</i>	<i>Probit regression with Crowdfunding Success as a dependent variable</i>	<i>Without including any crowdfunding performance variable</i>	<i>Including the variable Pledged Amount (Ln)</i>	<i>Including the variable Crowdfunding Success</i>
ESO	-0.385** (0.194)	-0.450* (0.230)	0.463* (0.260)	0.593** (0.253)	0.544** (0.262)
Pledged Amount (Ln)				0.401*** (0.068)	
Crowdfunding Success					0.564** (0.240)
Goal (Ln)	0.371*** (0.052)	-0.751*** (0.081)			
Top Startup Areas	0.240** (0.109)	0.167 (0.155)	0.209 (0.150)	0.096 (0.156)	0.180 (0.150)
Size of the Entrepreneurial Team	0.283*** (0.058)	0.340*** (0.096)	0.398*** (0.085)	0.312*** (0.092)	0.382*** (0.086)
Average Industry Experience (Ln)	-0.122 (0.076)	-0.283*** (0.011)	-0.068*** (0.016)	-0.069*** (0.017)	-0.064*** (0.016)
MBA	-0.022 (0.169)	-0.073 (0.250)	0.061 (0.247)	0.065 (0.251)	0.075 (0.249)
PhD	0.128 (0.172)	-0.257 (0.210)	0.567*** (0.199)	0.549*** (0.212)	0.598*** (0.199)
Women	-0.075 (0.193)	0.044 (0.282)	0.011 (0.263)	0.096 (0.256)	0.026 (0.262)
Previous New Ventures	-0.135 (0.126)	-0.227 (0.167)	0.303* (0.164)	0.343* (0.176)	0.295* (0.167)
Entrepreneur Past Successful Funding Experience	0.679*** (0.182)	1.077*** (0.312)	0.897*** (0.281)	0.697** (0.286)	0.837*** (0.280)
Patents before Crowdfunding	1.140*** (0.184)	0.059 (0.813)			
Patents after Crowdfunding			1.800*** (0.450)	1.576*** (0.422)	1.808*** (0.428)
Year of Establishment (dummies)	Included	Included	Included	Included	Included
Constant	7.112*** (0.694)	9.370*** (1.057)	-2.091*** (0.616)	-6.384*** (0.943)	-2.524*** (0.583)
<i>N. obs</i>	469	469	469	469	469
<i>R² / Pseudo R²</i>	0.245	0.281	0.240	0.316	0.255

Standard errors in parentheses - * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$